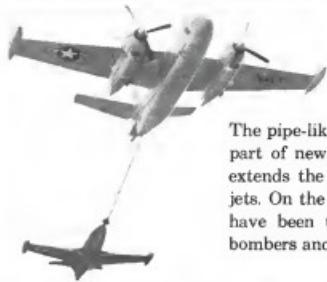


# AVIATION WEEK

A McGRAW-HILL PUBLICATION

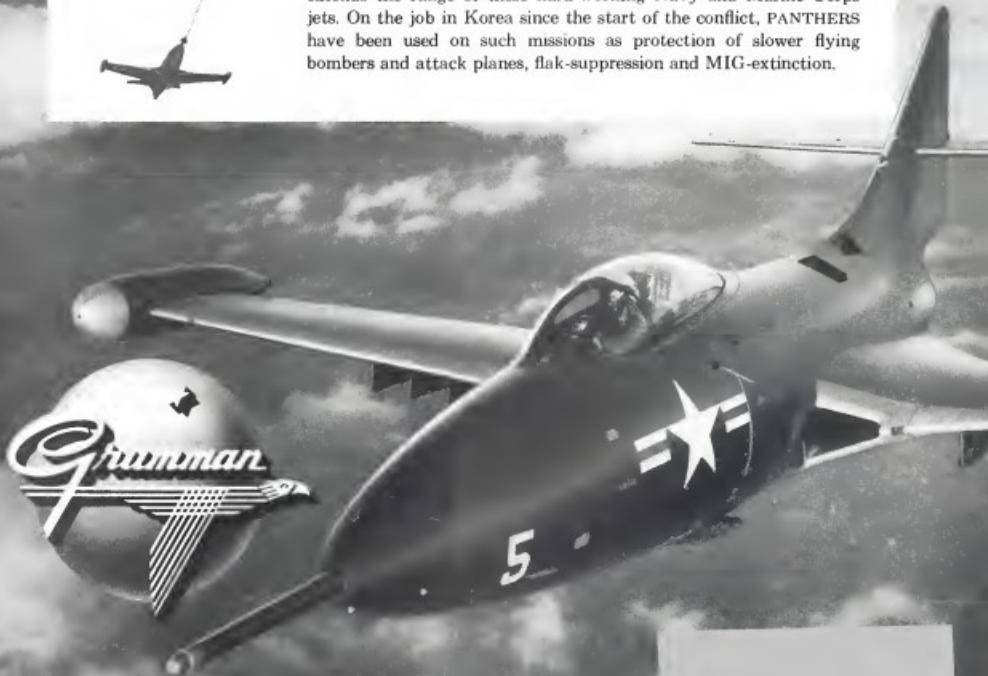
DEC. 29, 1952

50 CENTS



## Longer Legs for NAVY PANTHERS

The pipe-like extension on the nose of this GRUMMAN PANTHER is part of newly developed in-flight refueling equipment that greatly extends the range of these hard-working Navy and Marine Corps jets. On the job in Korea since the start of the conflict, PANTHERS have been used on such missions as protection of slower flying bombers and attack planes, flak-suppression and MIG-extinction.



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Contractors to the Armed Forces

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**Easily adaptable units require  
minimum design revision!**

Outgrowth of the original Sundstrand Constant Speed Drive is the package type, mounted directly on the engine pad. Engineers have found this model easily adaptable to existing engines, highly efficient in extraction power, and readily available. Other Sundstrand drives include the "staged type" which is designed onto the main aircraft engine and uses engine oil, like the "split-disk-type" where the hydraulic pump is mounted on the engine accessory pad, while the hydraulic motor is attached to the generator, remotely located in the aircraft. For your best bid on the drive most suitable to your requirements, check on Sundstrand's reliable aircraft, expert engineering, and precision production.

**What you can expect from  
Sundstrand Constant Speed Drives**

- Maximum, continuous power for A-C generators, through load speeds of 3000-1000 rpm
- Any number of A-C generators can be operated in parallel at constant 400 cycle frequency within  $\pm 1\%$  under steady-state conditions.
- Reliability is guaranteed and the load is distributed uniformly within a 2 Kc under the specified conditions—regardless of changes in electrical system loads or variations in the operation of the aircraft engines.
- Completely dependable, fully integrated systems—designed on several leading types of aircraft



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LADERS • BRAKES • BREAKAWAYS AND STABILIZER JACKS • BRAKING TOOLS • HYDRAULIC CHOCKS

**B.F. Goodrich**



**How B. F. Goodrich  
makes it hot for ice**

**S**UPPLYING air protection for jet-type aircraft at engine junctions is no longer a problem for B. F. Goodrich engineers. With double-blade outlet ducts they can get a skin-right fit over bridges, around cowlings, canards and ailerons.

A B. F. Goodrich De-Icer development, electric rubber can be made only one-eighth of an inch thick. In case of electrical failure, water supplies heat to melt the snow deposits before they freeze. It is the most efficient method of de-icing aircraft wings, because it removes snow without the need of applying great amounts of heat. It simplifies design, saves weight, can be centered on the aircraft, and requires little power or space—and uses only the electricity furnished by the power's regular power supply.

Here are some applications—all of different shapes—where the BFG electric rubber de-icer has given successful service. It is a typical development of BFG's engineering and research facilities. Other B. F. Goodrich aircraft products include prop. de-icing blades, pressure De-icers, Passover Sliding Zippers, Avian, inflatable anti-icing boots, and various fuel cell Brownout switches. The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

*The B. F. Goodrich electric rubber De-icer is also used on wing hydraulic lines, water tanks, spar fairings, pitot tubes and many other airplane parts. It is a typical development of BFG's engineering and research facilities. Other B. F. Goodrich aircraft products include prop. de-icing blades, pressure De-icers, Passover Sliding Zippers, Avian, inflatable anti-icing boots, and various fuel cell Brownout switches. The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

**B.F. Goodrich**  
FIRST IN RUBBER





## NEWS DIGEST

#### New Reverse Prop Proposal Circulated

A proposal to modify all existing propeller control systems on Boeing airplanes to prevent inadvertent propeller reversal is being evaluated by the industry by David Weleg, acting chief of the CAA Aircraft Engineering Division.

Pugnat, author of *Handbook*, proposed greater modulation with a decrease pitch ratio value (Aviation Week, Nov. 17, p. 76). It also overrules a reporting order on Grotius propeller installed on about 10 Boeing aircraft (Aviation Week, Jan. 20).

The modification is described as an effort to operation to a solid valve change proposed by Air Line Pilots Assoc. in March 1952 (AVIATION Week Apr. 18, p. 84).

Industry has been asked to comment on the proposals by Jan F. Dara for welfare and manufacturers' compliance will depend on how fast Mandato Standard produces the consensus model.

The Hamilton Standard propeller configuration applies to all Douglas DC-6 aircraft and to Convair 240 and 340 transports which do not have "lift to reverse" features. The propeller drive system provides that the propeller reversing control shall be substantially different from the motion for closing the throttles.

## **Differential**

Douglas C-12A Liftmaster (DC-6A) has started trans-Atlantic operations for MATS. Initial flight carried 32 passengers and more than 6,000 lb of mail from Westover AFB, Mass., to London, England.

Delta Air Lines has accepted delivery of the first of its 10 Convair-Laser 340s. It marked the twenty-eighth 340 delivered on a total of 125 ordered.

Guided missile training for USAF personnel at USAF Missile Test Center, Decatur, Fla., has been shifted by Bell Aircraft Corp. at Buffalo, N.Y.

John C. Nash, 56, who has held various posts with Pan American World Airways as Latin America since 1939 and Dec. 11.

An \$8 million control center is to be built by Strategic Air Command at Offutt AFB, Omaha, Neb.



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A "Well's returned then gives us the  
end of directions.

By Christopher E. Basile, Jr., was elected chairman of the board of directors of the National Electronics Conference at the annual meeting held Dec. 10 at Xerox Research Foundation of the Xerox Institute of Technology, of which he is executive director.

## Financial

McDonnell Aircraft Corp., St. Louis, Mo., has declared a regular quarterly cash dividend of 25 cents payable Jan. 2, to shareholders of record on Dec. 26.

Ryan Aeronautical Co., San Diego, Calif., shows net profit of \$875,339 for the past twelve months, \$1,316,000 less than double that for 1951. Total sales for the current period were \$33,066,250, \$7,770,000 more than the previous annual total.

Ryan Aircraft Co. has recently received \$6 million worth of new orders, including \$2 million from General Electric for J-6 jet transports and \$1 million each from Douglas Aircraft Co., and Lockheed Co.

## International

Aero Canada CF-100 twin jet aircraft RCAF fighter flew 1,100 mi from Ottawa to Winnipeg, Canada, in 1 hr. 49 min., reportedly the longest jet plane flight ever made in the

International air cargo service was started by Lone Herway Ltd., Toronto, Canada, from that city to Niagara, Buffalo, and Kingston, Jamaica, B. W. I., using Avco Tudor transport. Most will be used on round flights.

Inspiring Avant best her own woman's speed mark over a closed 100 km. circuit when on Dec. 22 she flew a 100 km. flight at 100.000 ft. altitude. DH Vampire Mk. 58, Mazzini Emanuele powered by a Hispano-Suiza jet engine. Her average speed was 74.377 mph.

The Atmospheric Research and Advisory Council of North Atlantic Treaty Organization held its second meeting last week. Dr. Theodore Von Karman, chief of the Scientific Advisory Board, Office of USIA Chief of Staff, and Dr. Hugh L. Dryden, director of National Advisory Council for Astronautics, are US representatives on the NATO research group.

**Greater Size and Speed in Aircraft**  
have created engineering problems, the solution of which has required longer and larger forgings of high-strength aluminum alloy. Examples shown above are forged structural members used in a modern military bomber, the largest more than seven feet long. These are forged on an 18,000-ton press, the biggest ever built in this country.

**Wynona-Gordon Experience**—the most extensive in the industry—a keeping abreast of new forging demands involving the use of Steel, Aluminum, Magnesium, High Density Alloys and Titanium.

*Standard of the Industry for  
More than Sixty-five Years*

**WYMAN-GORDON**  
FOUNDRIES OF ALUMINUM + MAGNESIUM + STEEL  
WORCESTER, MASSACHUSETTS  
HARVEY, ILLINOIS      DETROIT, MICHIGAN



# Front Line Express

**Close Assault Transports** are designed to meet the exacting requirements of the Air Force and Army.

No other planes are capable of delivering vehicles, weapons and troops to forward combat areas by landing — or evicting casualties from battleholes direct to rear area hospitals.

**ATRIUM** — truly the **front line express**.



## AVIATION CALENDAR

- Jan. 25—Symposium on Industrial Applications of Aeronautics. One-day symposium sponsored by Midwest Research Institute, Hotel Pennsylvania, Kansas City, Mo.
- Jan. 31-Bi-annual meeting and engineering display of Society of Automotive Engineers, Sherman-Cadillac Hotel, Detroit.
- Feb. 14-16—AIAA-HDMS Conference on High Performance Measurements, Statler Hotel, Washington, D. C.
- Jan. 25-Mar. 7—Electro Control Spring Optimization Training School, University of Florida, Orlando, Fla.
- Jan. 19-25—Post Manufacturing Conference, Hotel Charlotte, Charlotte, N.C.
- Jan. 19-25—Winter general meeting of the American Institute of Electrical Engineers, Hotel Astor, New York, N.Y.
- Jan. 26-29—Annual Meeting of Institute of Aerospace Sciences, Hotel Astor, New York, N.Y. (Annual Night Meeting, Jan. 28)
- Feb. 12-21—National Aviation Technical Council annual meeting, Atlantic City, N.J.
- Feb. 18—New York Section of the Instrument Society of America, Hotel Statler, New York, N.Y.
- Feb. 18-March 1—Annual conference of the Society of the Plastics Industry, Ross Islander Hotel, Seattle, Wash., Seattle, Wash., Washington, D. C.
- Mar. 16-19—Eleventh Annual Conference, Society of the Plastic Industry Council, Ross Islander Hotel, Seattle, Wash., Seattle, Wash., Canada.
- Mar. 21-27—National Production Forum of the SAE, Hotel Statler, Cleveland, Ohio.
- Mar. 31-Apr. 2—First International Major Space Exploration Related Guided Asteroid Workshop, Bell Telephone Laboratories, Holmdel, N.J.
- Apr. 6-12—Second Annual International Marine Spots Show, Grand Central Palace, New York, N.Y.
- Apr. 20-23—Automatic Production Process, Material Aeronautic Meeting and Aircraft Engineering Display (SAC), Hotel Cortez, El Paso, Texas, and Hotel Statler, New York, N.Y.
- May 11-15—AIAA National Conference on Aerospace Electronics, Dayton Masonic Hotel, Dayton, Ohio.
- May 18-22—1968 National Materials Show and Exposition, Convention Hall, Philadelphia, Pa.
- June 9-11—Second International Aviation Trade Show, Hotel Statler, New York, N.Y.
- Sept. 7-13—1968 SIAC Convention Year IV, Hotel Statler, New York, N.Y. (Annual SIAC-AIAA-AIAA-Aerospace Association Conference, London)
- Oct. 18—International Air Show, England to Christchurch, N.Z., entry deadline Jan. 31.

## PICTURE CREDITS

- Top tank: Courtesy,相亲, Waco, Wash.; Middle left: Waco, Wash.; Middle right: Douglas Aircraft Co., Long Beach, Calif.; Bottom left: Raytheon, Waltham, Mass.; Middle: Lockheed, Burbank, Calif.; Bottom right: McDonnell Douglas, St. Louis, Mo.



SEA TRIALS FOR CONVAIR SEA DART—Rear's new Convair XF2X-1 Sea Dart defeating flying boat fighters, world's first, is seen in photo above and below undergoing test trials in San Diego Bay. Barely visible under forward fuselage is craft's novel hydro-disk landing gear. Note how spray jet status engine exhausts beneath cockpit canopy, while XF2X-1 places its exhausts at high speed

## Navy's Latest Jet Planes Begin Tests

**XFT-1 DETAILED**—Wings bent low above water, the Sea Dart took deck on the fly, permitting a close look at its configuration. Power plants in the prototype are two Westinghouse J46s. More powerful Westinghouse J46s are scheduled to be fitted later. Navy has ordered a dozen F2X-1s in addition to two prototypes. Cost will be approximately \$2,150,000 each. (Also see Aviation Week Dec. 5, p. 15.)

**DOUGLAS XAD-1 ALIGHT**—Big new Navy attack bomber (below) is right. This view emphasizes sharp sweep of the wings. Townsplants under the wings is probe for Westinghouse J46. USAF version will be the XB-66. Production bows are being raised at Douglas, El Segundo, Calif. A twin 20-mm. canister turret, also controlled as fitted at the A-4C's tail.



# Boeing B-52

jet power packages by

# ROHR



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## WHO'S WHERE

### AIA Elections

Melody J. Pfeifer, president of Republic Aviation Corp., Farmingdale, L.I., N.Y., has been elected chairman of the board of governors of the Aircraft Industries Assn. for the first half of 1981. Second chairman for the second half is Oliver P. Eichler, chair man of the board of Northrop Aircraft Inc., Hawthorne, Calif.

Arnie DeWitt C. Ramsey, USN (Ret.), has been elected AIA president for 1981. Named to the executive committee in addition to Pfeifer, Eichler and Ramsey, Foyt, and El. G. Rawle, president of Thompson-Pfeifer Corp., and Ian C. Baker, Hughes Aircraft Co. Not present:

E. D. Meltz was selected vice president and Western Region general manager and Jerome Bond, Jr. was named secretary treasurer.

### Changes

Rep. Con Henry C. Kostellfors, Pan American World Airways executive, has been recalled to active duty with NAVFAC for 60 days. He will lead a majority operation group.

Paul S. Baker, engineering manager for Chaney Wright Aircraft, Hobart, Okla., is leaving the firm at the end of 1981. His future plans have not been announced.

W. G. Smith has been named assistant manager of Piper Aircraft Corp., Lock Haven, Pa.

Louis W. Ritter has been designated supervisor of field service and training section of Wright Avionics division, Con-Wright Corp., Wood Ridge, N.J. Walter Van Doren has been assigned as supervisor of the aircraft division service. Bernard M. McPhee has been named assistant manager of the Space Party Division, and Kenneth E. Wilkinson has been given the post of the communications division section. George W. Morris has been designated sales manager, Electronic Division, Con-Wright Corp.

H. Sharpe has joined Marshall Engineering, Hatfield, England, to handle worldwide liaison with airline operators.

Howard R. Johnson has been promoted to the General Sales & Marketing Council of Comair Corp., as a member of the sales department.

William (Pat) Paton has joined Pan American Aviation Corp., Los Angeles as controller. Robert H. Johnson has joined Pan Am as manager of its transoceanic water in the publications department.

### Elected to the Board

John E. Bowers, president of National Distillers Products Corp., has been elected a director of Pan Am. While Bowers is the second newest director, the death of the late William S. Tamm.

William A. Bradley, Dallas attorney and insurance company board chairman, has been elected a director of Bausch International Aircraft.

## INDUSTRY OBSERVER

► Washington is buzzing with rumors of a substantial presidential cut in the fiscal 1981 budget submitted by Department of Defense. Some estimates place the President's cut at high as \$15 billion.

► Navy has confirmed that Grumman FWF-3 Panthers are en route over Korea. The latest model Panthers powered by the PAWA J48 turbogear recently shot down a pair of MiG-15s from a formation attacking Task Force 77 in the Sea of Japan.

► Indications are that the first Grumman overwing Cougars (TFB-6) powered by the 2,200-lb thrust version of the J48 will soon be on the way to Korea. The Cougar uses a "wing tail" similar to Lockheed's modified horizontal tail on the F3B-E for improved control at transonic speeds.

► Allison division of General Motors Corp. reports its T63-Lewis ported by T38 turboprops has logged 175 flights totaling more than 160 hours.

► Arco Division of General Aniline & Film Corp. has developed an automatic pilot and mode selector flight test in a Piper PA-34 enroute to California. Arco expects to market its autopilot soon for a price of about \$1,000, considerably lower than its current competitor.

► Watch for Kellert Aircraft Corp., Cranford, N.J., to make a comeback in rotary-wing aircraft. Kellert is reported to have paid off its bankruptcy debts and is now at work with a staff of 250 people on military parts and subcontract, all in the helicopter field. The corporation also is working on two new advanced rotary-wing designs.

► Reynolds Metals recently developed an 18-ft helicopter rotor blade made by an electronic extension process. Price for the raw blade in quantity production will be about \$55.

► USAF has consolidated its three operational and modification contracts with Hayes Aircraft Co. of Birmingham, Ala., for C-130, C-124 and B-52 aircraft into a single contract that permits USAF to add to the Birmingham plant workload. Under the new contract USAF buys management services of Hayes for the entire Birmingham center and can schedule additional work on new type aircraft as required.

► Short S.3-3堪培拉轰炸机型是在设计者为 a British fighter type that probably will be built by English Electric, maker of the Canberra bomber. Other variants of the S.3-3 may appear during the research process.

► Thompson Products will operate a new jet engine test facility for Navy at Fairmont, Ohio, northeast of Cincinnati. Construction will be financed by Navy. Purpose of the new lab is to test jet engine components developed by private contractors. Cost is estimated at about \$1 million.

► Convair Aircraft is studying a super-derivative kit for attachment to its 1953 Model 370 derivative to enhance its sales appeal for the twin market. The kit would feature detachable tanks suspended under each wing equipped with wind-sensing bars to control the spraying or dusting mechanism. New maximum flying speed of the Model 370, aided by large flaps, would help sprayer operations.

► Swedish air force has signed a license agreement to build Rohr Rover Avia jets for its Saab-37 Viggen attack plane. This indicates the Swedes are abandoning their expensive efforts to build their own jet engine industry by utilizing Swedish engineering ability rather than relying on design imports.

► McDonnell Aircraft's F-101 long range USAF fighter will have the Pratt & Whitney J57 as its production model.

## Washington Roundup

### Wait-and-See Period

The developments in Washington, now in the definition of the "wait-and-see" period before the new Administration takes over, give some indication of what to come.

President Truman is putting on the spot Republican congressmen who might have a say in not enough in the defense budget he will submit to Congress before he leaves office. His defense budget is reported to total between \$38 and \$41 billion compared with this year's \$36 billion, and will increase \$10.4 billion for the Air Force, compared with this year's \$20 billion.

The outgoing President's resolve, indicating Defense must plan to adopt adequate defense at a high political price.

"Our present defense mobilization program does not even approach the level of what our country could do if we had to."

Nevertheless, there has been a good deal of talk about the country's so-called military preparedness, a defense program which is not up to standard. This is because it can go wrong, because it could become idle less than five years from now, because it could not be used to meet a decision to go to war, the defense program is at a point below the minimum needs of our national security.

This would happen at a time when we are confronted by a potential enemy that is very hostile and very powerful. And that potential enemy is putting a large political proportion of his national product into the building of military strength, year after year, more so than us.

"The people are wise enough to know the difference between hot economy and cold economy. They are wise enough to know that any thing that may be spent to prevent a new world war is bound to be far less than should be spent in fighting it. The people are also wise enough to know that we can afford to pay the cost of maintaining a defense to prevent a new world war. We can afford to complete our defense budget. We can afford the cost of maintaining our mobilization base in readiness for any emergency."

### Defense Leadership

Defense leadership in the Eisenhower Administration will still see the joint committee of aircraft manufacturers to the Senate Armed Services Subcommittee on Defense Department new "Tasks the low-key of procurement and production. It is composed of ten men: borden and leaven.

Eisenhower's designee for Defense Secretary and Undersecretary and Secretary of Aeronautics, and Air Force top production men, Navy Secretary designate Robert McRae, has had extensive military experience.

President is in a wait-and-see mood of officials on Jan. 20, the inauguration date. Some arrangement to keep on certain key men such as Assistant Secretary for Air John Cushing and Air Force's Undersecretary Russell Ogden, is expected. New officials will be hard put to replace or oppose aspects of the 1953 fiscal year defense budget. Congressional budget hearings start as October.

Defense Secretary Robert Lovett's few tactics toward USAF and Navy aircraft programs may live him honored partially by knowledge that House Armed Services Committee is sitting on a report sharply criticizing the services for buying obsolescent major Airforce to Lovett's strict discrediting methods of old model stores

from the previous writer into the current year Defense Appropriation Act giving him complete control over each day production of procurement. In reports next July 1 these figures will be given to the House and Senate and the authority will be exercised by Congress.

Smoothing administration policy, which faced into the open briefly with USAF Undersecretary Russell Ogden's announcement that in addition to Air Force there are other building air forces—Army, Navy and Marines—is leading the already strong committee in Congress to give wide authority to Defense Department's top command to check on all construction and equipment.

Gen. Adm. Arthur Radford's somewhat as a key defense policy, under the Eisenhower Administration, is based on "Total Defense." He will be able to work with the Post-war-class Committee on National Mobilization if the Navy's 1963 plan is in the B-16 storage or inventory. Radford is assigned to the Pacific following his recent flight before House Armed Services Committee.

Gen. Benjamin Chidsey, now head of Air Defense Command, leads in Air Force operations on a case closer to Gen. Hoyt Vandenberg, due to return in Chief of Staff in April. USAF news report that President Eisenhower already has indicated he wants Lt. Gen. Ernest Nimitz to continue service with NATO, with which he has been connected since its start.

### Legion Switch

America Legion, which has pressed Congress for militant action, starting since the end of World War II, is switching to a campaign for a strong Air Force. Spokesman of the movement, Col. George Evans, now vice president of National Armistic Air, as well as an active Legion member.

### Civil Aviation

Commerce Department is expected to have weak aviation leadership under the new Administration. Robert Mayo Murphy, designated to become Undersecretary for Transportation, is the sole member of the top command with any aviation or transportation background. He served in the Air Force during the war, reaching the rank of colonel. Senator George S. McGhee (D-Tenn.) and Undersecretary designee Walter W. Stumpf, however, did much work with a civilian transportation. Vice head of the Pennsylvania Economic Development project, learned organization to promote aviation in government. Murphy probably will apply himself to continuing in CAB.

Senate members of Air Crash Investigation Act, now forming a legislative committee to push for a re-enactment of the 1955 CAB Act to give them recognized standing in an committee. The committee also will launch a new aggressive fight on scheduled voluntary.

### Management Shakeups?

There is talk in aviation circles of:

- A possible shakeup of United Air Lines management, with replacement of the leadership of President W. A. Patterson at year.
- A possible shakeup of Pan American and American Go management with Richard Boulter, president, to the memo center.

—Katherine Johnson

# AVIATION WEEK

## Services Blueprint Dual-Economy Plants

- Production Acceleration Insurance Program will assure rapid conversion to "total war" output.
- Funds will be asked to provide 200 aircraft firms with special high-volume standby tooling.

By Robert Hiltz

most efficient mobilization goals. Each prime contractor participating in PAIP also is responsible for planning the mobilization requirements for all of his key subcontractors.

Prime contractors also will order and distribute to their subcontractors whatever tools and production equipment is needed to meet its current requirements. That square is part of a joint USAF-Navy Bureau of Aeronautics program known as PAIP—Production Acceleration Insurance Program. Navy's Baker clearly has moved his approach toward tabling slightly more than \$1 billion for the program, now being funded. The USG program eventually is expected to be comparable. Navy clearly has allocated most of its PAIP funds and expects to have most of its industrial mobile facilities ready by the end of 1957.

► **Equipment.** Basic purpose of PAIP is to create enough stand-by productive capacity within the present framework of the industry to make possible a quick acceleration from peacetime production levels to the requirements of all-out mobilization. PAIP must contribute an initial long lead-time stage such as engines, engines, avionic equipment, guns and hardware, nightfights, etc.

USAFAF and the Navy are in effect planning to spend money now to make their already productive capacity an insurance against bottlenecks developing if and when a jump to all-out mobilization goals is necessary.

PAIP must be organized by the Department of Defense and the Office of Defense Mobilization. Both agencies indicated they would support the request for PAIP from before Congress. Mobile tools and production equipment for the program will be delivered only after all requirements for current production needs are fulfilled. The backlog of PAIP tool orders will be the backbone tool volume in production for the current aircraft programs begin to define.

► These Services-200 firms are constituted in the USAF portion of PAIP. Each firm selected for PAIP has done its own planning of what it needs to

fit within USAF bar one of this type plant now operating at Kansas City, where F-14 aircraft and Convair planes can be being assembled in the same plant. A Navy dual purpose-type plant at Elgin, Illinois, has been with dual aircraft assembly planned.

In a dual-purpose plant, the tasks necessary for aircraft military production will be set up in "cold" mode ready for serial production operation if there is sufficient space, as also stated when they can be moved easily to produce wartime machinery at the speed rates.

► **Dispersed plant under separate mode.** This involves construction of a mobile plant near a civilian plant so labor can be diverted easily from one activity to another. The mobile plant can be moved to a nearby plant at either a small "lock-in" or "lock-out" mode to maintain a nucleus of supervisory personnel and additional "cold" tool set up for when short production is required.

► **Pilot-line production by licensees of power aircraft contractors.** PAIP will mean purchase of expensive, high-volume tooling instead of the kind actually required by its current production pace. For example, automatic "splices" will be provided instead of conventional "splice" or general-purpose tools. More important, though, this will be a wide variety of closure types that would be sufficient for current rates.

For firms which have converted portions of their facilities from civilian to military production, PAIP is aimed at providing a greater degree of flexibility in scaling this shift and an easier method for producing for both parts of the current dual mission.

► **Part-time PAIP plants.** PAIP plants can consist of the U.S. and need to continue the present dual mission. This will mean to reduce interest and it will be necessary to retain the military productive capacity of firms that normally could shift their emphasis to civilian production as needed. Details discussed. There is a considerable variety of methods by which these dual-duty firms will participate in the PAIP program. These include:

• The dual-purpose-type plant, having both civilian and military production under the same roof. This is perhaps the best-known type and is a part of the new Defense Secretary, Charles

## CAA Says Radar Needs 'Saucer' Filter

Somewhere between radar targets positioned on slopes by helicopters and atmospheric transonic overpasses may require a new radar accuracy enabling air traffic controllers to spot the difference, a Civil Aeronautics Administration spokesman said.

The infrared report compiled by R. C. Braden and T. K. Vickery of the Washington Technical Documentation Center says "things which appear as soft, low contrast radar returns when viewed through a telescope or the radar dome reflect reduced motion in the transonic transition zone."

Observation of undisturbed moving targets at radar airports is neither new nor unusual, the CAA report said, but before the "saucer filter" era these were called "ghosts, pixels or angels." Comptilations of radar observations with the U.S. Weather Bureau records indicate that a transonic overpass about 100 miles from an airport such as Atlanta occurs on an average

► Radar Reflector. "Pebbles" (pebbles) represent reflections in the leading and trailing edge surfaces of 80 targets of this type that a large number of these targets was actually atmospheric reflections of the radar beam," the report said. "Apparently these reflections were produced by isolated reflecting areas, which traveled with the wind so as to change the temperature inversion levels."

"Although the exact size, shape and composition of these reflected areas are not known, it is believed that they are very small, irregular objects, possibly ice crystals, occurring in a thin layer of air flowing around the aircraft in flight," the report said.

The report also believed to be the largest of a single plane crash in civilian aviation.

Heading the Air Force investigation was Maj. Gen. V. E. Bernhard, deputy assistant general for flight safety, and Brig. Gen. Robert J.



AFT SECTION of crashed C-124 revealed atmospherically tinted, contained most corrosion.

## Four Generals Probe C-124 Crash

USAF assigned four generals, including its top radar safety man, to lead a full-scale probe into the cause of the crash of a Douglas C-124 Globemaster II shortly after liftoff from Lajes AFB, Madeira, Dec. 21, with loss of 88 soldiers presumed.

The plane may have lost control and the Boeing it attained sufficient speed to drop. It seemed to stagger up to an altitude of 300 ft. It stalled, then skidded and fell to the ground about two miles from takeoff.

The death toll was believed to be the largest in a single plane crash in civilian aviation.

Heading the Air Force investigation was Maj. Gen. V. E. Bernhard, deputy assistant general for flight safety, and Brig. Gen. Robert J.

John, CAA radar observers at Cleveland and Boston also reported unidentified radar targets. All and targets correlated with transonic inversions or were sighted when low-velocity paths from the radar long past the airport area.

## Air Labor Contracts Face for Change

Ex-escalator clause in the North American Douglas, United Aircraft and other union contracts' labor contracts will be avoided by February because the Bureau of Labor Statistics is putting out a new cost-of-living index. Most contract renewals are tied to the present BLS index and call for revised wage rates.

There are two major index changes:

- It will measure the rise in living costs

after World War II, instead of since 1939-48. With a new base period of 1957-59 equal to 100, the index figure will round off instead of 100, while it now stands using the old standard.

• The "escalator clause" has been dropped. BLS will price things it never included before, such as the cost of home ownership, home maintenance and used cars. It will survey prices in 66, instead of 34, cities and will include more medium and small cities. And it will change—according to recent changes in family spending habits—the importance of various expenditures in the total cost of living picture.

► Steward Index—Result. The index will not fluctuate as much as it has in the past. Actuals available clauses usually provide for an adjustment of one cent an hour for every 1.14-cent shift in the index. Cost of living in going to have

to fluctuate almost twice as much, per contract, to raise the new index to more than 134 points.

How to effect this change in the escalator clauses will be the subject of labor-management negotiations. Both sides will continue to work toward a new and improved contract.

F-8s dropping the old index in December. The January index will not be announced until February. For those who need to look to the old pattern last of 1957-59, BLS also will publish during 1963 the new index with that base. This will allow easier time to shift to the newer base. But the "switch bracket" of goods and services covered will be the new not the old.

## Ford Gets Contract Increase for 357s

An Army recently awarded by \$10 million in contracts with the Ford Aerospace Engine Division for manufacture of Pratt & Whitney J57 turbofan engines. The account manager for the engine and the Ford division for jet production of Pratt's Chicago plant.

John Doherty, vice president of Pratt & Whitney's Propulsion Group, said the first delivery dates are scheduled for February 1964. AFM products schedules at the Chicago plant run through the first half of 1975. Doherty said, and the company is planning production "far beyond that date."

Ford's initial production of PW-104/105 jetsons started for the B-57C/C-124 and C-90 will commence for normal aircraft, reaching a peak output next year.

More than 400 jetsons, being used as piston engine replacements, short-haul and low-speed aircraft for the pilot line will be converted later for long-haul out-of-patrol. Total has ordered since 1960 some 200 new jetsons for an air fleet line and 250 additional jetsons are on order for plants supplying 215 parts and subassemblies.

## Britannia Cargo Plans

(McGraw-Hill World News)

London—British Airways Corp. soon will begin using the new Boeing Stratoliner freighter as a transatlantic freight cargo transport.

A BOAC spokesman said the airline's first Britannia on cargo will provide "the highest standards of speedy freight transport as a world-wide scale." Stratocruiser now carries the bulk of BOAC cargo freight.

The airline also said it expects the Britannia and Concorde 1, 2 and 3 to be used in passenger, cargo and executive operations aircraft used by visiting heads.

## Wright Memorial Observances

Truman presents trophies; urges continued air power building; ASA wants more research and planning.

Katy Hawk, N. C.—Three North American F-104 Sabre Bee 4 formation "wingmen" dove and pulled over the Kill Devil Hill Memorial in the Wright brothers' last work, claiming the 40th anniversary observance of powered flight.

The high-speed jets zoomed over at 47,000 ft, shot a few rounds directly at the plane, and buzzed an acoustic recording device on the coast at nearby Kill Devil Hill. The "wingmen" set off by each plane, as the song goes, the first successfully launched the music banner. It was believed to be the first public demonstration of a fighter that could fly at a three-plane formation.

► Truman Presents Trophies. In Washington, President Lyndon B. Johnson presented the Wright Trophy to the Dowell family and presented Josephine of the Wright Brothers Trophy. It was John Glenn, in a speech, who noted that a President had participated personally in the Wright observances.

Mr. Johnson urged that the U. S. continue to build up its space and continue to make strategic technological advances in motion to keep the peace.

► Go to Jones in Kill Devil, competitor of the Wright Trophy, said his power should be kept pre-eminent and warned that "We cannot afford to gamble in what we have in the past that we will have time in an emergency to build up our Air Force."

John Strock, amateur director of NASA's Langley Laboratory, received the Collier Trophy, and Maj. Gen. Leon V. Brink, Civil Air Patrol commander, received the Brewer Trophy for contributions to amateur aviation.

In Dayton, the Wright anniversary observance was highlighted in the appearance of Maj. Charles Yeager, first USAF pilot to fly faster than sound (AVIATION Week Dec. 22, 1947), and Capt. J. Stade Nash, who recently set the new world's speed record of 699.9 mph, and the Wright brothers achieved power

► Dodge. The Wright observance was highlighted in the appearance of Maj. Charles Yeager, first USAF pilot to fly faster than sound (AVIATION Week Dec. 22, 1947), and Capt. J. Stade Nash, who recently set the new world's speed record of 699.9 mph, and the Wright brothers achieved power



CANBERRA FAMILY PORTRAIT

Four different English Electric Canberra models seen lined up at the company's field at Warton, Lancashire. From left to right: Mk. 4 bomber, Mk. 1 bomber/tugger; Mk. 1 photo reconnaissance and Mk. 2 bombers. The latter is the first production model. Each plane is powered by two Rolls-Royce Avon and flow jets. End load of the line is using a twin-boom setup on the Canberras. Mk. 2 Morris is building Canberras in U. S. for the Air Force in the B-17s.



Harold E. Talbott  
Secretary of the Air Force



Roger M. Kies  
Deputy Secretary of Defense



Robert R. Anderson  
Secretary of the Army



Robert T. Rossen Stevens  
Secretary of the Navy

Admiral's name 1953, is described as an aggressive air expansionist in his company and is expected to carry a heavy load as the operational level for USAF.

With General Vandenberg's campaign promise to provide more defense of long and short range ballistic intercontinental, the new administration apparently favors a big procurement "end tape" cutting arrangement for itself. This is expected to avoid the situation.

"Anderson is a deceptively diverse type of person for the Army Quartermaster Corps in World War II, and was a Texas Democrat for Eisenhower."

Stevens is twice chairman of the Federal Reserve Bank of New York. He served as Executive Director, International Affairs of World War II and a consultant on American procurement in World War II.

Talbott was director of aircraft production for the War Production Board in World War II (Armament Week Dec 15, p. 14).

All five of the new defense nominees set in Washington last week with their counterparts in the Truman Administration for a policy briefing.

Meanwhile, John A. McCone, former Undersecretary of the Air Force, continues to be considered as a possible Defense Department appointment. He has been named as a candidate for Air Force Undersecretary by members of the Senate Armed Services Committee in consideration of his Air Force, possibly with an agreement that he will succeed Talbott at a later date. Another indication is that he might succeed to the Munitions Board thatmanship.

Among the present second level defense executives likely to stay on for awhile according to Pentagon forecast are Russell L. Gurnett, Air Force Undersecretary, and John J. Flanagan, Navy Assistant Secretary for Air. They may be retained because of their familiarity with those responsibilities or procurement programs. Assistant Secretary of Defense (comptroller) Wilfred J. McNeil, head of the department's Fiscal Department also is expected to stay on for an indefinite period.

- Roger M. Kies, 46, General Motors executive, as Deputy Secretary of Defense under Defense Secretary Charles E. Wilson, former president of General Motors.
- Robert R. Anderson, Texas oil man and ranch manager, as Secretary of the Navy.
- Robert T. Rossen Stevens, New Jersey textile executive and director of General Electric and General Foods, as Secretary of the Army.

Kies, GM vice president and general manager of its Truck and Coach

#### Japs Seek Contract

(McGraw-Hill News)

Tokyo—Four Japanese former military organizations are negotiating with the Far East Air Force to handle repair and maintenance of its planes. They are Myōtoku, Kawasaki, Shin Meisei and Fuji.

If the deal goes through, it could be the initial step in solving the aviation crisis. It would be necessary to release some Japanese airport and maintenance facilities now being used by PEAF. Financial aid also would be needed.

Japanese military experts strongly oppose this concept. They insist that Japan's defense is essentially the re-

## Talbott Named AF Secretary

But there still is much speculation on who will be in lower echelons of the Defense Department under GOP.

Suspension is building up over how long the current undersecretaries and associate undersecretaries will stay in the Defense Department. Air Force, and Navy also the Transportation Administrators takes over Jan. 20.

The question was raised at the Pentagon last week after the official announcement confirming Harold E. Talbott, New York industrialist, as Air Force Secretary on December 10, and among these other men in top government defense posts.

## How Much Air Power for Japan?

USAF says Japan should have independent air force of jet interceptors; Army wants tactical group.

By R. P. (Piper) Martin  
(McGraw-Hill World News)

Tokyo—The U.S. Army and the Air Force in Japan are locked in a bitter struggle over what type of air force Japan should have when it becomes independent from America.

The dispute stems from two service chiefs once again in Washington, converging their views.

• Gen. Mac. Clark, the Far East Command headquarters already is building the foundations for a tactical air force to be controlled by the future Japanese army.

• The U.S. Air Force East Air Force, which has been shot out of its base since the planning stages of Japanese independence, now demands that as an independent air force be set up instead of a commando force.

• Brigadier General Ladys, who is beginning to have a strong voice on their country's aviation plans, generally supports USAF views, but wants a much larger air force than most Americans have conveniently or strategically dreamt.

• The Basic Objective—There is little or no conflict between Army and Air Force over the basic U.S. objective: a new Japanese army, navy and air force capable of defending the home islands. This is part of the broad U.S. strategic policy of making free Asia conscious enough to protect themselves from both internal and external pressures, a sort of "bulge" defense policy to contain Communist China. Ultimately hope is to use the drive on U.S. expansion and subversive potential by using Japan to defend Asian nations against communism.

The dispute in Japan represents a bitter conflict among American and Japanese military leaders over what日本's defense requirements and a lack of friend U.S. policy. Gen. Clark, former Adjutant General, is responsible for the Army's position in the present planning. He made up exclusively of Army officers. Gen. Mac. Clark is an infantryman. Their conclusion is that Japan should be defended by a large ground army supported initially by the U.S. Air Force. If and when a Japanese air force is developed according to this concept, it would consist almost entirely of fighter bombers for close support under Japanese command.

Japanese military experts strongly oppose this concept. They insist that Japan's defense is essentially the re-

vised problem of ensuring strategic bombardment and naval blockade.

A small, highly maneuverable air force of interceptors would be best.

The Japanese are also in favor of a small, mobile air force.

• Prof. Dr. USAF—Most Japanese believe American policy was to deny them any air force. They did not perceive any argument about air power or readiness with Clark's advice staff.

Recently, however, Gen. Charles Knobell, chief of intelligence, Air Force, has recommended a group of planes to expand and strengthen Japan's air force should it develop.

Brig. Gen. Clark's attitude reflected Prof. Dr. Knobell's existing concern over the trend in military planning for Japan.

The National Police Corps, known as an arm limited to liaison, reconnaissance and artillery spotting, pilots and maintenance men are being trained at the Matsuyama Airfield.

The force will consist of approximately 125 light-weight propeller aircraft L-36 and R-5A-B.

Recently Tokai Aircraft Co. signed a contract with Fletcher Aviation Corp., Provo, Calif., to produce the T-25 Fletcher Defender, a single-engine close support aircraft. The Defender, which will be the first plane to be produced in Japan, according to an

unnamed plane, is to be sold to non-Communist countries in Asia. But Clark's headquarters hopes to purchase the plane for Japan's new air force.

As these offices begin to set the tone outlines of what they greatly expect for the war, the most costly equipment in our history.

They insisted that Gen. Clark is a leading exponent in the U.S. Air Force's tactical air power as well as for flight. Now, according to Air Force officials, he seems attempting to apply to Japan the theory that was espoused in the United States Air Force offices before it would be reasonably expensive and a variation of the old, practical method of defeating Japan, which is to create an independent air force based around an intercepter aircraft.

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FARMER'S HELPER

Dope P-13A agricultural biplane is seen dispensing a high-density spray from its dispensing boom suspended beneath the wings. The plane can put out up to 15 gal/min in a 30-ft. swath at 10 gal/min in a 60-ft. width. The new high volume equipment has been especially valuable in applying adhesives on California coffee crops, allowing more sunlight to reach the leaf buds and increasing overwinter flowering.





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## AERONAUTICAL ENGINEERING

### Will Prone Flight Lick High G-Loads?

- We can take greater loads when lying down.
- But is that really best position for flying?

By David A. Anderson

A large portion of combat survival is caused by the pilot's position.

Now that wing and tail surfaces have been strained to the maximum dimension, and high thrust rates from small-diameter turbines, the use of a seated man is the governing "dog discipline."

But what if the pilot weren't seated? Prone pilots have been periodically mentioned in recent years as a way to combat fatigue or prone flight has possibly inspired the knowledge of increased human tolerance to G-loading in that position. For instance, the average pilot can take about 20G for half a minute or so if he's lying on his face or back. If he is sitting up, he starts acting long before that.

► **Why Prone?**—So about the time designers began to move about maneuvering at high speeds, they began to consider the prone pilot again. These were the reasons behind their renewed interest:

- **Higher G tolerance.** Lying prone, the pilot can take higher overall G-loading for longer periods of time.

- **Drag reduction.** If the pilot is lying down, he presents less frontal area. Less frontal area means less drag.

- **Psychological advantage.** It seems to be instinctive to lie flat in the face of enemy fire. One of the reasons advanced by proponents of the prone configuration is that the pilot feels more secure when sitting up.

These are the major points, but there are others. Designers point out that by eliminating the canopy—which would follow from a prone-position layout—you eliminate the problems of the canopy. These are some of the reasons about sitting at high pressure differences, or optical illusions or rolling due to leaning.

Instrument readability is improved because of the absence of the conventional control column. And not having the column and wheel should simplify the ejection problem, my these familiar with cockpit layout.

- **Downside-down of these reasons**



NORTHROP YB-35, 214-mph-powered craft, was used for prone flights in 1944.



MODIFIED F4U had prone position in its nose. Pilot found it comfortable.



THE X-1 has been used for some years by Bell's aeronautics for prone flights.





# A New Page in Aviation Progress

The  
Re-evaluation of  
Load Ratings for  
Airframe Control  
Bearings

## The Need.

Because of the tremendous advances made in aircraft design and development, ratings for airframe control bearings have been under serious study for several years. This study has been conducted partly by a group of committees representing the Bureau of Aeronautics, the U.S. Air Force, the National Aircraft Standards Committee and the Airframe Bearing Requirements Committee. The purpose of the study has been to develop a method of rating airframe control bearings to more closely simulate conditions encountered in actual flight.

## The Present Accepted Method.

Selection of control bearings is made

solely on the basis of the bearings' static "load rating" (KNSP) value only — ignoring completely such factors as normal or combined loads, differences in application, and cycles of oscillation. This method therefore does not provide an accurate rating of individual bearing capacities.

## The New Method.

In determining the new load ratings a criterion other than "load rating" is used. Selecting a bearing by means of the new system involves two basic factors: (1) the total load which should be equal to or in excess of static loads; (2) oscillatory rating or fatigue life of the bearing is checked to insure that the desired average life will be obtained under normal load conditions. This assures

the right bearing for each application with increased efficiency and longer service life often with savings in weight and cost.

## The New Method In Use.

Several dozens of current fighter aircraft have adopted the new ratings which permit greater use of standard AN and friction-coated bearings than under the old "load rating" system.

**New Tables Now Available.** For load ratings on Fafnir deep-groove radial aircraft control bearings and self-aligning aircraft control bearings based on the new method of computation. Send for complete descriptive material plus tables. The Fafnir Bearing Company, New Britain, Connecticut.

*Another Fafnir  
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# AVIONICS



COMPACT CONSTRUCTION makes digital-type computer look good for airborne use.



PLUG-IN SUBASSEMBLIES are bolt-on until flat trim, no point insulation.

## Digital Computer Trend Seen

Verisimilitude, accuracy and productivity give it edge over analog type for fire control and navigation.

By Philip Klass

A Boeing Aircraft Co. digital computer, developed for an automated "airframe control system," was recently a trend toward "digital" air frame power, bombing, and navigation computers which have previously appeared in prove analog fashion. A USAF spokesman can great pleasure in the digital type.

The disclosure that Hughes is working on a digital computer package for the F-4 Phantom fighter, based on a recent IRP paper by Dr. E. G. Miller who heads the Hughes Computer Systems Dept., is another welcome. Hughes builds fire-control systems for the F-4D, F-4C, and F-4B, and is developing a new fire-control system for the Convair F-102 and Republic F-105.

► **Analog vs. Digital**—The terms "analog" and "digital" are somewhat ambiguous inasmuch as a "digital" computer solving any problem depends on a series of a series of "analog" computer operations operating on "digital data."

However, as the terms are usually applied, they imply these general characteristics:

- An analog computer is one which simulates a problem, using electrical potential, voltage, amperage, currents, etc., as surrogates of physical variables. The status of these electrical variables, including the computer can perform directly such operations as addition, subtraction, multiplication, division, differentiation, integration, and trigonometric function. Analog computer memory depends upon the storage of an individual component.
- A digital computer works the problem in terms of digits or discrete values, but is able to perform only addition or subtraction of these digits. By successive addition or subtraction, a digital computer is able to multiply or divide. In the use of stored programs, a digital computer can compute, with excellent accuracy other mathematical and trigonometric operations.

► **Analog Disadvantages**—Although analog computers have been used with and in guidance, bombing and navigation, they have several handicaps and disadvantages:

- Accuracy difficulties. At each stage of analog computation, there is some loss of accuracy, enough so that in certain circumstances the errors of previous operations accumulate.
- Tended to one tool. An analog computer is related to the specific guidance, bombing, or navigation problem. For example, an analog-type computer designed for guidance is not easily adapted to solving navigation problems and vice versa.

• Inaccuracy in respect of size. Geometric configuration, sensor accuracy, or obtainable scale only increase the physical size factor of the computer which increases using larger and heavier components.

- Difficult to maintain. An analog computer usually requires ultraprecise potentiometers, gears, cams, and other mechanical parts which are costly and difficult to manufacture and to replace.

► **Digital Advantages**—It's what makes the digital computer look attractive for military use.

- No accuracy loss. As long as the computer is functioning properly, there is no loss of accuracy, regardless of the number of operations performed.
- Versatility. A single digital computer unit can be designed to solve many

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## ENGINES

We dominate development work  
of Curtis Wright aircraft engines,  
aeronautical apparatus, in all branches  
of engineering.

grism and position, or bombing patterns and there is little or no weight or computational penalty for this added economy. A digital computer could, for example, be used for navigation at the start of a flight, later at the end of a mission it could be switched to an intercept or bombing duties, and still have room to navigate again.

► **Basic to simulation.** The digital computer is made up of many identical assemblies (flip-flops, networks, etc.) which are easier and cheaper to mass produce than analog computers. Digital computers are also more dimensionally accurate from production.

► **Extremely more reliable.** Except for its program, which controls the sequence of digital computer operations, and its "memory" which stores data, a digital computer has no moving parts. This makes it potentially more reliable than its analog counterpart. When rugged, long-life transistors can be substituted for the many vacuum tubes now used in digital computers, much of the potential reliability should be realized. (Use of transistors in analog computers is growing, however, they are already in use in circuits at temperatures above 700° F.)

► **Major Advantages.** For size and complexity of the programming and data storage, transistors appear to be the major candidates in the use of widespread use of onboard digital computers. In ground-based digital computers, these elements have been large and bulky, but for airborne applications, where the computers need solve only several types of specialized problems, it should be possible to reduce the size of these elements.

► **Future.** It is felt by many that the ultimate has practically been reached in the development of analog techniques for airborne equipment. Capt. W. H. Rothstein of the Wright Air Development Center writes in the

This is the most rugged and light-weight crystal-controlled transmitter of the market and is especially suited under conditions of temperature, vibration, altitude and acceleration. The transmitter produces a two watt frequency modulated signal within the telemetering band of 215 to 225 mc.

## SPECIFICATIONS

### OUTPUT RF:

Load  
Impedance  
Center Frequency  
Power Output

50 ohms nominal  
150 to 200 ohms  
2 watts minimum

### TYPICAL OPERATION

-L. Current	0.5A
-B. Current	0.005A
-B+ Current	0.005A
Power Output	2.2 watts
Distortion	±1% total harmonic distortion No modulation or noise at 4

### INSTALLATION

Site	U.S. High & Low Altitude Altitude
Weight	1.1 pounds
Ground Loop Power and Modulation R.F. Output	1.5 milliwatts R.F. 100-1200W (over 100 hours) 100-1200W (over 100 hours)

Weatherproof, impact, water-tight and  
vibration testing available



### RESEARCH DEVICE

New transistorized accelerometers use minute shock or vibration over the range of 5 to 5,000 cps. and can operate over the temperature range of -196° to 700° F. Accelerometers are available in three models. One is available in three models, with output signal gradients of 5 or 10 mils per G, or response of 50 mils per G at 1,000 cps. Manufacturer is Teledyne, 500 E. California, Pasadena 1, Calif.

**STABLE...RELIABLE...COMPACT**

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*the new Bendix-Pacific*  
**TXV-13**  
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October issue of the IRE Arizona Electronic Professional Group newsletter.

In contrast, the explanation of the digital microwave has not been seriously undertaken to date, and its publication have not been thoroughly explored." Reference continues: "It appears that various development areas will permit enhancement of equipment, both which concern the most important problem of digital microwave. With this basic problem solved, it is almost certain that the digital microwave will occur at an earliest position in aircraft systems too." Reference concludes.

## Guided Missile Programs Offer Challenging Opportunities



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## FILTER CENTER

- New Gyro-Stabilized Platform-Sperry Gyro is developing a gyro stabilized platform as a possible long-term replacement for the separate servos and dampeners used and is awaiting approval of Department of Defense tests which concern the most important problem of digital navigation. With this basic problem solved, it is almost certain that the digital compass will occur at an earliest position in aircraft systems too." Reference concludes.

Equipment will be able to operate at temperatures as high as 200°K but presumably this would be at the expense of useful life.

- Gear Bearings Eliminated—Avco Corp. says it is producing gear with out "burrs" of cast lead, that obtain using the largest single source of gear power, the GEMI plant. An Avco spokesman said he expected "that all gear produced through the air bearing stage." This prompted speculation that Avco is either using a vibration-free type of gear developed by Sperry Gyro and disclosed several years ago, or is using magnetic gear suspension.

- J75 to Use Scintilla Ignition—Bendix Scintilla will supply a new high voltage igniter, discharge-type igniter, to General Electric's new J75 turbofan engine.

- Pulse Output Tube—General Electric's production of high-vacuum electron tubes for avionics and space applications has increased more than 400% since 1958. Called the Five Star line, the tubes are an outgrowth of GE's reliable program for Aerospace Radio Inc. (Avionics)

- M-11 Sets Up Dallas Components—Sperry-Honeywell has moved a 32-man engineering group to Dallas to work on Cluster Wind Avionics. The adopted name indicates great interest in the development of a cluster system for the M-11 aircraft, now available in CVA's Regular missile. The group, headed by John V. Seifert, a M-11 test pilot originally, is expected to double in size. Project will require two years for completion. —PK



SMALL IRIDIUM TERMINALS

New iridium terminals and test-type connectors for small wires (size 21 to 18) have been announced by Avco-Monroe Products, Inc. The company says the new tiny terminals are shielded against heat loss from R.F. noise. They consist of a variety of tongue shapes with or without polarization. But-type connectors for joining two wires are a transport addition to present pinhole connector. (Avionics) Monroe Products, Inc., 1800 Fahey St., Hazelwood, Pa.

WRITE: MANAGER, ENGINEERING PERSONNEL

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## PRODUCTION

### Magnesium Gains Favor As Plane Metal

- Industry group favors of production advances.
- Huge cost savings points to new techniques.

By Irving Stone

The trend shows that strong, light weight, nonmagnetic magnesium firmly has established itself as a member of the metals family of metals. In a relatively short period, magnesium has developed a fast rate of use in every engineering field of transportation application. Problems remain, but these are being solved progressively.

The design and production picture showing low estimates uses have become well known clearly for a large group of experiments, processes and uses of the magnesium Alcoa's recent two-day 8th Annual Meeting at New York.

► Cost-Way Trend—One of the high-lighting engineering aspects thinking for application of the metal is a large cost reduction. This is due to the digging down into it. Wright Air Development Center, B-16, cost \$16,000 per ton, as against a magnesium alloy of 40-60, probably the heaviest aircraft surface ever cast.

It was pointed out in the Air Force sponsored program to explore the possibility of using the casting technique instead of extremely expensive hot extrusion or true, cast and machined. Northrop, Alcoa, Inc., designed the aluminum-Aluminum Co. of America cast a magnesium alloy of magnesium alloy, probably the heaviest aircraft surface ever cast.

There has been no efficient designation of the aircraft for which this type of wing is intended, but it appears that it is being investigated in connection with a guided missile. This would be in keeping with Air Materiel Command thinking that casting should plus a big plus in missile making. (Avionics) Wren, Nov. 3, p. 37.

► In Hobbs—Alcoa's Ward Stevens announced that the wing panel started out as one piece structure—but was cut into two classified configurations. Each had low impact strength and required a spaced rivet for purchased parts of the wings. Weight of about 200 lb. represents about 50% of the cost of the original.

Sheet thickness at the root is about



1 in., tapering to 4 in. at the tip. Root casting is cast into the exterior edge, however, apparently for stiffening. Surface check has indicated that corner control is in good as could be expected from a forged sheet surface.

The finishing scheme called for only sandblasting, with no attempt to do anything on the outer surface at this stage of development. The panel is expected to have met several aircraft standards.

As an initial experimental casting, this achievement is significant. It isn't approach accepted to yet in the aircraft industry, but there's no doubt that it will provide considerable benefit for other applications, among a model to demonstrate the feasibility of large casting of this type.

► Recent Applications—In other large aircraft aircraft applications, magnesium alloys have played an important role. For example, engine mountings and flaps made of magnesium alloy are to be tested on two F-86's.

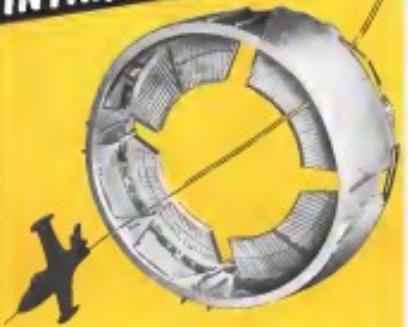
► F-86. A prolonged Government F-86-2 program with an all-magnesium cockpit also is being explored. (Avionics) Wren, Sept. 3, p. 21.

► B-36. In the B-36, magnesium adds up to these weight savings and extensions, 3,000 lb. reference and component casting, 600 lb. dust bags and ratings in simultaneous operation, 200 lb. fuel tanks, 200 lb. mid-tower, 1,600 lb. tail, 15,000 lb. rear.

► B-47. Use of the material on the B-47 is conservative by comparison. Appli-

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MAGNESIUM castings have been made of ducts (top), wingspans (center) and various components (bottom).

claims on the plane have been restricted somewhat to secondary and non-structural parts, involving low losses, they have required a non-  
About 250 pounds of magnesium there is such a weight reduction in the  
little savings this is probably not set in the advanced areas. In the B-47, magnesium has been used in the tail fairing structure, tailfin mount panel, reverse control casting and coated access doors. Some of the metal has been used as skin on hatch-lid door panels. As a result of severe buffeting, cracks originating at the rivet holes developed after short service life.

Other applications in the B-47 include extensive use of magnesium allow in fairings and castings in the control surface areas, tail trimmings, rudder, elevators, ailerons, stabilizers, and control panels. Most of these parts are cast, and require only a small amount of machining.

**Finish Problems:** When porous parts have not been coated with difficult

paint have been experienced with finishes on the magnesium—particularly on the B-47 head bay door. Paint that was too thick, and other effects of poor application, produced poor adhesion between coating and protective finish to peal in large strips. On the leading edge, the paint had stood up very well under test erosion so long as the finish remained uniform, but once the finish was broken—usually at rivet points—the sheet would begin to corrode.

Friction-welded magnesium parts are not used, but spot-welded components are employed. Cast Black reports. It has been found that the control of spotwelds in magnesium has been more critical than with aluminum because of the bad effects of excessive spot size.

**Lage Use in C-47:** Possibly the greatest application of magnesium—percentage wise in addition to aerospace weight—is in the C-47 (20,000). About 17% of the engine weight—600 pounds of it—is magnesium sheet and casting.

In addition to fairing skin, there are 98 AZ-61 castings, the largest weighing 3 lb. Black reports that 4 pounds in AZ-41C alloy is being evaluated because of the material's unique micro-tensile characteristics.

Other applications in this category include the gearbox housing, wheels, aircraft tire, center control system and pilot and cockpit seats.

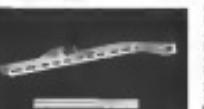
Castings consist of the Douglas Dyno No. 7, a single cast of three magnesium parts and two open ends of larger parts, which are elongated before final parting. Zinc chlorate tape is used between diametric weld joints.

**In Big Cargo Plane:** The C-124A Globemaster uses magnesium parts extensively. Black says. One large cast component weighs 2,000 lb. in ZK-60A extruded sheet for the main cargo floor support structure. The application has attracted considerable public recognition here for the plane. Another magnesium casting is used in the cargo floor structure.

The large extrusion is used not about in aircraft, with some simple roll splices as flanges and the cutting of web holes for lighting. The only parts added are cargo railhead fittings and angles for attachment of other structural members.

By comparing, a building beam in aluminum would have required extensions for top and bottom caps, webs and stiffeners. Black points out. Special sections would have had to be devised to reduce and limit deformations in the casting with the desired strength and stiffness. The thick support beam's web acts as a continuous compression member to transfer these load concentrations without any additional parts.

**Cessna Data:** Early in the C-124



WEIGHT-SAVING magnesium castings include leading edge section (top), and parts of planes (center and bottom).

practices, some corrosion occurred in the beams. An ingot in the zinc chlorate process acted as a conductor for electrolytic action with other metals, and the metal also decomposes more easily under electrical action. Also, the process did not offer enough protection against a cathodic trigger. If the magnesium cleaned off, the zinc chlorate would give adequate corrosion prevention.

Black says a new process of zinc base has been developed to give better corrosion protection than the zinc chlorate and longer usage period. He says. Proper cleaning after decompression treatment was found necessary, and soaking of the zinc chlorate had to be maintained below 60° F on the pH scale. No corrosion, which has been known to occur on riveted parts in the plane or in aircraft, has been found in use.

**Thin-Walled Casting:** Examples of light, thin-walled magnesium castings were cited by R. H. Oehlert of the C. H. Oehlert Mfg. Co., Los Angeles. Illustrating the economy possible with a cast unit versus a built-up component, Oehlert mentioned an engine mount casting of a large diameter—28 in. in diameter and 12 in. in height. This unit weighed \$12,500 for precision pattern equipment and the part itself cost \$7,500. Compared to the fabrication needed for the part world-wide came to \$131,300 and the part would

have been expensive because of surface qualities of the sheet, and a somewhat high notch sensitivity requires special care to prevent scratches in handling. Black reports. Service experience with the machinery has been good.

**Brackets:** Then—in the Globemaster's central surface hinge supports and landing gear door brackets. The B-47 and C-47 have been used. These have been used for all nose-lip hinge brackets. There are the extended leading edge fairings a good two years service record in the plane seven years in the processor C-70.

Magnesium used casting composite 93% of coated system patty and bell-milled brackets, but the cost is not real value of what would be subject to wear that would damage protective finish. Also, the material is not very practical for striking, basic same other methods, such as sheet metal, is suggested for basic magnesium. Spherical striking is permissible, Black reports, but it is not recommended.

**Discontinuous:** Boeing-Soviet with magnesium in the C-124's water-skid tail, has no heat resistance and has been discontinued. Deformed magnesium sheet was joined to magnesium casting by welding. The protective coating didn't adhere to the metal and oxidation caused fractures along the edge attachment of casting to the sheet.

There were several instances, says Black, where magnesium fragility was used for lighter in weight and cost and wear leading part down. But these were changed to aluminum forgings when high deflections were experienced. The magnesium parts had adequate strength but gave excessive deflection.

Attachment of magnesium components is with 5056 aluminum rivets, steel bolts and Brad Lockbolts. With the latter two units, either the hole or the rivet is pre-drilled before riveting. Black reports. In one case, the rivet fracture was started with a rivet puller. Edge distance, for one, is about three times the fracture diameter, in general. Normal Lockbolt installation with aluminum has up to 80% to live load reduction.

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**Aviation Photo:** The first deck in the C-124A was fabricated from FS-140. Deck FS-141 large combustion sheet and a study is underway to lower this to 6 ft. 6 in. This material is cold formed to 1 in. band width.

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cost \$1,713. Another unit developed for the "Dove" is an airfoil disc 10 in. long, 394 in. wide, with a skin thickness of 1 in.

► **Mobile Applications:** Could remote mobile base cut by Cyclohm resemble a booster station 30 ft. 6 in. long and 23 in. wide, with external air and metal wall thicknesses varying from 4 in. to 1 in. At 50 ft. 6 in. high, it weighs 13 lb., of which a large portion is concentrated at the pivot where the part sits like a ball.

Another cast magnesium article part is a horizontal 36 in. long with a cross-section of 15 in. x 10 in. Wall thicknesses and faces 1 in., down to 1/2 in. An experimental mobile remote control base and mounting brackets in several parts of the unit. Weight is 42 lb., cost is \$800, apparently a lot less than the expense of a comparable fabricated part.

An extremely thin-walled magnesium casting has a profile in known as "Dovetailed." This is 42 in. long, 11 in. wide, has a 7-in. view. Wall thickness is 1 in. Weight is 16 lb. In Ingrid, this unit is suspended under an oval cable and successfully stands upright by its own weight.

► **Aerospace Parts:** Ingrid is casting the profile of a horizontal stabilizer for a small aircraft, changing the shape of a constant cross-section. The unit is 111 in. long, 14 in. wide, with a broad cross-section of 6 in. x 10 in. A second type under one reference is 45 in. long, 25 in. wide with 14 in. x 10 in. and 5 in. thickness.

Other thin-walled, light-weight magnesium casting made by Cyclohm are similar wingspans, varying from straight edges to double gusseted heads. All of these are cast with 100% magnesium, as better material than Die-Cast, a 90% magnesium weight savings of 30%. In fact, the 111 in. long, 14 in. wide, 10 in. thick, 5 in. deep, 10 in. span aircraft wing part was sold on design calculated stack with remnants welded on—an advantage reported to have resulted in 30% less of the likelihood of assembly in production due to welding savings.

A 45-in. diameter component, 18x15x16 in. also embodies wingspan passenger held in m-804 in.

A wingspan passenger also has been incorporated in part of an airfoil—a thin skin, weighing 3 lb. and including a heavy aluminum base on the leading end. With a thickness of 1 in., a gusseted head is 10 in. x 10 in., a gusseted tail is 10 in. x 10 in.

► **Wing Pan:** This will come from Cyclohm later, but is a magnesium casting with a leading edge section and a short trailing edge, and a short nose part. The long, 12 in. wide, with a 5-in. maximum depth. Weight is 71 lb. Edge edge is 1 in. thick and has a short nose profile of 1/2 in. Thickness steps down to 1/2 in. at the nose section. It

isged ribs, 1/2 in. thick, reinforce the section.

An aileron section cast by Cyclohm has a wall thickness of 1 in. It measures 21 ft. by 12 ft. in. and is based with two integral ribs. A steel insert for a control rod is used as a part of the unit.

Another part in the leading edge of an aileron for an advanced aircraft. The unit height from the flat dimension is rated at 10 ft. 3 in. to 10 ft. 6 in. Length is about 5 ft. The casting is hollow. Has reinforcing ribs, and thickness steps from 6 in. to 3 in. at aft. Reinforcement arms provide for large attachment. Weight of the casting is only 16 lb.

A fine flap is cast in a 27x15 in. section, 6 in. x 6 in. Both ends and hinge bases are cast integrally. In the past two another production dive flap—49x37 in., with skin and air tank were shipped down to 4 in.

► **Small Aircraft:** Magnesium alloy casting is the conventional material (not aluminum) preferred by Advanced Precision Casting Corp's chief metallurgist, Paul E. Miller; the demand for an aircraft-grade magnesium casting has been small. This might be attributed to a situation where magnesium generally has not been specified for the relatively small parts produced by the process.

In addition to parts cast in stock and other metals, Advanced is producing magnesium alloy investment casting for engine applications such as fuel and oil line return components (parts regarding pressure tightness), cylinder jackets such as exhaust ports, valve covers, cylinder sleeves, cylinder heads, and cylinder caps, plus interior fittings. Largest investment casting produced by Advanced is an engine cylinder 15 x 5 x 10 in. This weighs about 14 lb. and is for a jet fuel system. Smallest part cast for aircraft applications weighs about 9,100 gram.

## Engineering Schools To Graduate 93,000

An estimated 93,000 engineers will be graduated and available in the construction industry during the next five years, according to figures released by the U.S. Office of Education.

These estimates, recently published in the newsletter of the Engineering Manpower Commission, Engineers Joint Council, are based on forecasts for the fall term of 1972. Attitudes often accelerated over a number of years have been used to estimate final graduate totals. Figures do not take into account severe cutbacks, inflation, etc. Here is a year by year breakdown:

- 1969—29,000 engineering graduates
- 1970—32,000 graduates
- 1971—32,000 graduates
- 1972—29,000 graduates

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### ALSO ON THE MARKET

New plastic cable clamps save weight  
but are strong enough to take on the  
jobs of conventional clamps according  
to the manufacturer. Made of Stress  
thermoplastic, the clamps are said to  
resist fatigue and offer environmental  
conditions encountered in military ap-  
plications. Eddies Industries, Inc.  
Somerville, N.J.

Hand files made to even close tolerances  
are designed to prevent precision finish-  
ing. They are thinner and more flexible  
than steel. The manufacturer describes  
the product as one "more like a  
hand brush" than a file. Tuxor File &  
Hosefile Co., Philadelphia.

Better quality control can result with  
use of surface plates made of heavy  
precision finished black granite. The  
precision plates, manufactured by  
Lowell Granite Sales Plus Co.,  
1612 Packard Rd., Philadelphia.

Portable television for industrial use  
has self-contained closed circuit and can  
be used with standard television receiver.  
Kit can be utilized for wide  
variety of jobs. Typical examples are  
distant inspection tasks, operations  
hard to see, and multiple viewing.  
Dage Electronics Corp., Herk Grove  
Ill.

Through a pump, focus it through a  
denser lens, and refocus dry ice to  
the broadcast lens. The Lee-Ritter  
Type D-14 densitometer is a densitometer  
unit system, with the exception of a  
burner to replace air heat.

Rome is supplying the densitometer to  
the mechanical division of General  
Mills, Inc., for use with borohydrides  
produced for B-47 Strategic Bombers.

The air passing through is at about 1,700  
ips at 10° F. at 15 in. sec. The manufacturer  
describes it as a continuous  
dry explosive panel type, with a  
burn life of 300 hr. or 45,000 ft.

Lee Inc., Rome division, Rhine, Ohio.

### Improved Gas Filter

A new filtering tank offering about  
99% of all particles larger than 5  
microns from system gasline, according  
to the manufacturer. It has now  
interchangeable filter elements and is available  
in three sizes from 100 to 1,000 cu. ft.  
per min. The filter can be installed on an  
existing tank, either vertically or  
horizontally.

Pneumofor Products, Inc., Rahway,  
N.J.

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## AIR TRANSPORT



**LITTLE SILVER FLEET** of *Arauris Naufragio Del Agua Canna* 170s and 180s during the rains at the owner's home base, Gouyave, Essequibo. The two mid-size craft have successfully taken up daily scheduled safety patrols and handled the job without accident.

## **South American Airlines Use Lightplanes**

- Some equal DC-3 speed; allow easy maintenance.
  - Plane market upped by pilot training programs.

By Alexander McSpadden

**Wekots**-More than 180 Cessna aircraft, four place 170s and five place 190s are on scheduled airline and unscheduled air-taxi service in South America, Clear Channel, Cessna export sales manager, told Aviation Week.

The small single-occupant passenger vehicle transportation system which accepts and rejects density will not prove use of large equipment, Charles says, and steady hand proved a valuable means of augmenting the passenger carload transportation facilities in major areas.

► Smallplane Market—Chattam foresees a steady and growing smallplane market in South America as additional airline and air taxi services begin using

In the lighter planes in regions where other transports will still be present, we can use the simplicity of high wing all-metal assault with fixed tricycle landing gear, keep them to simpler maintenance operations for combat purposes. Charles' six points note that the 165 mph cruise speed of the Cessna 165 is comparable to DC-3 operational speed. While the 170 mph design speed is about 130 mph, the hill is several times faster than the speeds of surface-to-air interception over much of

district which the planes cover. Chub 808 3425

► No Accidents—Most active oil-Company reported entire operation to Aransas



ONE OF TWO Canadair CL-115s operated by British Colonial Airlines, British Honduras, as shown here, point up good cross-field performance for short-haul CL-115s.

178—despite its small 145 hp Centrifugal engine and four place designation, carried four passengers plus pilot on a semi-berth point high-altitude tour over the Colorado moun-

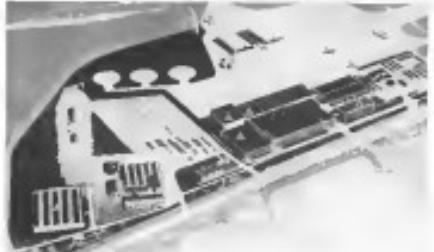
British Colonial Airlines, operating with its main base at Belize, British Honduras, operates two Convair 130 planes from Belize to San José Creek, and Puerto Gordo on Honduras and also to Chetumal, Mexico.

Chadton says his distribution partners are more than 15 nation wide partners in Brazil. One operates nine Convoy 170s and the others operate three 170s or more. Some of the new partners go deep into the interior of

Additional air taxi companies are being set up or are in operation at Asuncion and Chile with first place 120 passengers.

Details on the extent of these operations are not available yet.

\*Training Programs—Another facet of the Cessna program in South America must directly connected with air transport is standardization—the two-place Cessna 140 and the four-place 170 as training airplanes for government sponsored air clubs.



**UAL OVERHAUL FACILITIES** at San Francisco will look like this when they are completed in 1968. Shown are: 1. aircrafts, 2. carbine shop extensions, 3. engine test extensions, 4. DC-9 and Convair Lear overhauled hangars, 5. DC-7 and jet aircraft overhauled hangars, and 6. two-story office building and sheet metal shops.

## UAL Expands Maintenance Base

United Air Lines will expand its San Francisco maintenance base by 1968 to handle an estimated 27 planes a month—three DC-9s, 12 DC-6s and 12 DC-10s, the company says. It now handles 23 a month there, but doesn't hold half these as DC-10s.

The high degree of mechanization planned for the new facilities will result in a displacement of the base's existing staff by 1968—to a total of about 2,800 by 1974—while the amount of work capacity almost doubles.

President W. A. Patterson says plans for the expansion will be "verifying the present engine and maintenance shop, construction of two more over

hangars, one for DC-6s and Convairs, the other for DC-9s and future jet transports, and a two-story building for both additional office space and premises of short-term-and-ordering operations." Several rules of paving and steel area also will be laid.

This will add about 100,000 sq ft of shop, office and hangar space. A program begun last year and now reaching completion added 50,000 sq ft of warehouse space.

The company refuses to reveal even its approximate cost estimate for the new expansion program, but (unofficial) sources place it at substantially more than \$1 billion.

## Gorham Heads CAB Routes Division

Cab's Aeronautics Board has promoted James E. Gorham to head its important Routes and Comair Services division. He succeeds Donald Slatos, who recently resigned to join Pan American World Airways.

Gorham was chief of the "Special Studies" Section of Cab's Accounting and Statistics division, where he directed a major part of the Board's supply-situation projects. Gorham has represented the Board on inter-agency negotiations in planning and developing routes for airlines, including the Conference of Major Airlines. He also has participated in route studies and hearings for service route and mail route areas at CAB.

Personally popular Washington observers report that Gorham has a reputation for open-minded and careful treatment of all problems. His new

appointment to head the Routes and Comair Services division generally won Gorham's hearty approval.

Gorham comes to Cab with a history of six years with Trans California Airways in 1954 he immediately entered government service with the Federal Council of Transportation in New York and was transferred to Washington with the government shortly thereafter. He came to CAB in 1957 from the Office of Price Administration. He is married and has three children.

Important Route-Space usage problems involving Gorham during the coming year include:

- Colloidal range issue.
- Regional carrier applications along CAB's air service route network.
- The consideration of the reactivation of non-airline routes reported in previous issues of *Airline Week*.

- Nonstop investigation.
- IATA affairs. Agreements among the

international airlines, through their inter-type International Air Transport Ass., are subject to CAB approval or denial. Gorham's division treats a large proportion of the cases.

## Delta-C&S Merger Expected Jan. 20

The merger of Delta Air Lines and Chicago & Southern Air Lines probably will become effective by Jan. 20, Washington observers believe.

It is understood Cab's Aeronautics Board already has last approved the merger, subject to final negotiation of three CAB members who as operating division has proposed the merger order.

The case probably will go to Pres. de la Tour for executive approval before he leaves after Jan. 20, because the majority action transfer of the Cab's International Caribbean routes.

At present, Cab's Board has had a quorum (the minimum required by law for the meeting), it is believed, the three members who have legal responsibilities under the merger agreement have instructed the agency's airway division to prepare an approval of the merger. It would be subject to their signature on the opinion when prepared and to presidential approval of the entire formal joint by Mr. Trahan.

The CAB executive recommended to the Board that only the international aspects of the operation be retained by the President. But it is believed the Board found that the whole operation should be handled in one piece and that the merger is sure to get the President's approval. The international phase is a major subject in the domestic route system, over which CAB has control.

Eastern Air Lines asked the Board to prohibit Detroit Metro through service by the regional carrier Trans World Airlines' winter Trans-Cities routes. The American execiutives of the inactive New Orleans-San Jose route. A compromise decision is expected to be taken.

## Wiggins Wins CAB Renewal Hearing

Cab's Aeronautics Board yesterday has reopened the business file of Wiggin Aeromex, whose certificate would have expired by CAB's audit Dec. 31. The Board was decided to hear oral arguments for the reconsideration of the file of hearing requested in petitions submitted by Wiggin and New England Flying Service.

CAB specified in its new order that the arguments will be held "before the

full board." A CAB spokesman said his interpretation of the order means the agency cannot be held in partial procedural suspension and could approve of a fifth member of the Board.

Wiggins' late petition argued that fifth member. The present long-range board rule evades the Wiggin's argument, the two Republican senators, Gary Casy and Gerald Ford, voted with Senate Chairman Donald Ning to end the Wiggin's route expansion. Democratic Senators Joseph Adams and Jack Lee disagreed.

Adams, Casy, Lee and Ford all agreed to leave legislation out but only as a proviso for amendment. Outlook is that Wiggin is likely to go out of business after the hearings.

Wiggins' petition and a new, substantive route proposal did not receive adequate consideration in the original oral argument. Also petitioning for reconsideration were BellSouth, Inc., the Vermont Airline Company, State of New Hampshire, Northwest Miss. State of Rhode Island, and the Gannett Co. of Canada.

The new Board action ends the 1966 task. Andrus' former employment in Allis-Chalmers' route extensions and previous Northeast Andrus' basic route Pequabut Miss. is originally revealed in CAB's final Oct. 23, 1967 of Wiggin's certificate renewal.

In the original Board order denying Wiggin's renewal request, Ning, Ross and Gannett pointed to the extreme safety requirements and to New England's adequate surface transport network.

Adams and Lee said that Wiggin's petition has been reconsidered and that the new application route proposal should be tried before CAB makes a final decision.

## TWA C&S to Fly New York-Houston

Cab's Aeronautics Board has approved an interchanging agreement between Trans World Airlines and Chicago & Southern Air Lines that provides for one plane, one New York-Houston service.

The flight will not compete with Eastern Air Lines' nonstop on round trip service between the two cities.

The new service is set up primarily to give Pittsburgh direct flights to Memphis and Houston.

## Italy Tests New Delta

(Continued from page 10)

Milan, Italy's new delta wing Antonov Supertanker, powered by the Marzocchi turboprop, is being flight tested, according to the Italian Ministry. The plane, previously has been tested successfully with an Alfa Romeo

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## Domestic, International Airlines Incomes 1952

### DOMESTIC TRUNK AIRLINES

	Amount	% Change from 1951
Passenger revenue	\$667 million	+17
Mail revenue	37	-2
Freight revenue	13	+5
Fright revenue	25	+21
Other revenue	15	0
Total operating revenue	757	+15
Total operating expense	663	+20
Net operating income	94	-18

NOTE: Estimates based on non-audit financial data.  
Net operating income excludes federal income taxes and net operating income and expenses.

### INTERNATIONAL AIRLINES

	\$109 million	+13
Passenger revenue*	52	+8
U.S. mail revenue	10	+3
Freight and mail revenue	27	+9
Cargo revenues*	4	+17
Excess baggage fees*	4	+9
Nonsubsidiary revenue	97	+9
Total operating revenue	303	+13
Total operating expense	200	+13
Net operating revenue	103	+6

NOTE: Estimates based on non-audit reporting as of 1952.  
Revenue exclude \$3 million legal liability award April, 1945, to September, 1952, in Pan American. Revenue also includes "incidental and transport revenue".  
\*Scheduled operations only.

## Airline Profits Drop in 1952

ATA reports revenue up, but profits reduced by expansions, soaring labor and material costs.

Airline profits reported the 1952 will average less than 1951 around 10%, although revenues are up 17%. Total revenues were up 12.5% from 1951 to 1952, but it is too early to estimate industry profitability.

The profit problem has highlighted in a general prospect of airline revenue and expense by Dr. Lewis C. Scott, adl. director of the Air Transport Association's Research Division.

Scheduled domestic trunk airlines' 1952 profits before income taxes will drop 10% below last year to \$94 million.

International trunk lines' net before tax will drop 6% to about \$35 million. Nonsubsidiary airlines reported earnings will be off 44% to about \$37 million, not including the earnings of Pan American.

\*Cited Cause Pacific Drop—Domestic airline gross revenue down 15% for 1952 to \$77 million, while expenses increased 28%.

One factor that will continue to

influence 1953 is the

## Incomes of Irregular, Cargo and Local Service Carriers for 1952

### IRREGULAR SERVICE CARRIERS

	Amount	% Change from 1951
No. of passengers	713,388	+11
Rev. passenger sales	\$1,150,000	+21
Cargo ton-miles	750,000	-4
Total revenue	\$83	+25
Total expenses	\$62	+31
Operating profit	\$21	-54

NOTE: Estimates based on % increase for each month 1952 over same period 1951.

### CERTIFIED CARGO LINES

	98 million	= %
Freight ton-miles	\$16	-1
Operating revenue	17	+10
Operating expenses	1	-51

NOTE: Estimates based on non-audit reports.

### LOCAL SERVICE LINES

	\$19 million	+16
Passenger revenue	33	+13
Mail revenue	1	+10
Other revenue	1	+14
Total revenue	36	+14
Total expenses	41	+17
Operating loss	5	+5

NOTE: Estimates based on non-audit traffic, no monthly financial reports, with no account taken of valuation and fair value of the record July, 1952.

short array of the airline profit margins in the coming year is lower than last year due to the introduction of larger jets. The 1952 loads were already high.

► 1952 Summary.—The ATA estimate for overall U.S. air carrier revenues, including dividends on 1951 to passenger revenue \$109 million, 17% more than a year ago. Total revenue \$119 million, down 1.5%; cargo revenue \$127 million, up 8%; total revenue \$107 million, up 14%.

The percentage gains of the domestic trunklines were 20% greater than total airline totals in 1952.

► Operational losses. From the New York Airports shutdown last winter through the winter gas shortage last May, the airline generally had hard times that were reflected in earnings in the first half of the year.

► Rising labor and materials cost might continue through 1953 at a steeper rate than in 1952.

One factor that will continue to influence 1953 is the

agreement with Lake Central Airlines CAB approval of the merger depends largely upon Manley's success in cutting costs, which have increased more than the industry average during the past year's economic growth.

New Garuda Flight

(McGraw-Hill World News)

Melbourne.—A regular air service to Japan is being planned by Garuda Indonesian Airways, but certain equipment and financial problems remain involved.

Although some question about purchase of U.S. aircraft, indications set the orders will be placed in Europe or England.



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## Pilot Error Blamed In Comet Crash

By Nat McKittrick  
(McClatchy World News)

LONDON—Ministry of Civil Aviation investigation reported officially last week that pilot error caused the crash of a British Overseas Airways Corp. jet Comet shortly after the aircraft took off on Oct. 28 from Rome's Ciampino Airport. (AVIATION WEEK Nov. 24, p. 1.)

At Comptroller Sir Vernon Bloom, chief MCA investigator, said Capt. R. K. H. Cook had "let get the Comet airborne while it was in an extremely low altitude—nearly stalling the long jet engine in itself."

The Comet, en route from Rome to Johannesburg, South Africa, overflew the runway after abandoning takeoff and crashed into the ground at nearly 30° only about the impact boundaries. One of the 35 passengers aboard the Comet suffered slight injuries. The one passenger who was killed was an exemption of internal fittings and instruments, thus being unseated.

►**Comet Damage.** Large quantities of fuel spilled out of the Comet's port wing engine immediately after a runway overrun indicated rise of the tip of that wing and sheared off the pitch trim. This caused the aircraft to drop and the fuselage in the crash against the earth mountain, and a sturdy stand on the stratosphere nose engine was sheared

►**Official Report.** Here is the MCA investigation findings:

"At an unknown speed of 112 knots (20.9 mph), the captain lifted the aircraft into the air when he considered a safe height. He then released the control for nosedown up. At the same instant, the port wing dropped rather suddenly, and the aircraft began to roll along the ground."

The captain gave normal response and lateral level was regained.

"At that point, the captain moved the aileron's position was not heading up, although he made no reference to his compass indicator. A passenger seated in the rear of the cabin (near the shoulder) was 20°, which he associated with the nose of a staff. In spite of two voices (the passengers), the control column paddle continued."

Before the first officer had time to select undercarriage up, the aircraft came down on its main landing wheel and bounced. A decision to abandon the takeoff was made.

►**Comet Damage.** Large quantities of fuel spilled out of the Comet's port wing engine immediately after a runway overrun indicated rise of the tip of that wing and sheared off the pitch trim. This caused the aircraft to drop and the fuselage in the crash against the earth mountain, and a sturdy stand on the stratosphere nose engine was sheared

leave-following the engine to rotate on its transmission in a nose-down position. The nose wheel was forced up into its housing, and the tail bumper unit was torn from the rear of the Comet fuselage. These two units were held along the last 600 yd. of the impact after the crash.

►**No Engine Failure.** The MCA investigation said they found no failure or malfunctioning of the Comet's air frame or engines. All instruments worked within tolerance, they reported, and all five passenger seats (airline stretchers, crash worth operating floors, and survival boats) were unengaged.

An estimate of the degree of the Comet's nose high attitude was taken from reports of takeoff tests made by de Hirsch, builder of the jet aircraft. The reports said an incidence of nine degrees results in a partially stalled wing, giving high drag that affects the aircraft's acceleration and other responses that were noted by the pilot at low frequency buffeting.

The BMC's pilot manual specifies an incidence of four to six to undergo half degree of "pitch" in order to give a smooth movement of the nosewheel.

►**May Be Repaired With New Seats.** BOAC has taken an option as yet to replace the lost Comet with a new Series 1. The aircraft will carry of the canceled Comet now in the hands of underwriters.

serve to enter Frankfurt or Hamburg, Germany, during early in next year as new equipment becomes available.

►**Civil Aviation Board.** In a recent order issued in its fight to control unregulated airline ticket agent practices, The U. S. Court of Appeals, New Orleans, affirmed by lack of prosecution Miami Airline's appeal of an injunction by the Southern District Court of Florida. The airline was enjoined from carrying passengers but had an written agreement or passenger who were not tailored for Miami Airline.

►**Eastern Air Lines** will have completed within 14 months extend and back-credit financing of \$116 million flight equipment program that includes 60 Martin 4-84 and 14 Super Constellations already delivered, plus 36 propeller-engine Saenger Convars and imports. President E. V. Rickenbacker outlined the program's progress in a report to employee stockholders, who now own "indefinitely more than 20% of the company and constitute the largest single owner."

►**National Production Authority's Aircraft Section** has DPA approval of full cost aircraft production materials allowances valid for the second quarter of 1955 (the "C-9 program").

►**Northwest Airlines** has set an ideal fare for both Calgary and Edmonton on Canada's oil bases and vacation areas.

## SHORTLINES

►**Air Transport Asia.** Since early 1954 its predecessor, Panayang Airlines, an influential charter airline, will swap 25% from this year's 25 million to 33 million in 1955 and 53% from this year to 41 million by 1960, and that will give 41% and a cargo of 900,000 by 1960. Coach and cargo aircraft may boost the growth trend. ATA expects nearly 600 transoceanic flights scheduled in the U. S. for the holiday traffic including more than 100 military chartered and substantial extra cargo and crew moves.

►**Air Atlanta.** Air Atlanta changes its name to Alphabetic Airlines Jan. 1.

►**American Airlines** will have its first 50 passengers DC-6 coaches flying side-by-side early and 31 by January. Company boasts more than 4 million transoceanic flights a month in November, the second consecutive 4 million-plus month. This is a 50% increase over a year ago.

►**Airline** plans fortnightly European

flights between Paris, London, and Rome, starting in January. The flights will be nonstop and will be made by Douglas DC-4s and Super Constellations. The company has expanded its south DC-4 and stated it for future use in its Atlantic freight service.

►**Scandinavian Airlines** from Atlantic countries to Europe will open April 1955, the first three months of 1955 over a year ago. German ranked first in both import and export volume with France and Switzerland, with SWA President Raymond Nielsen predicted the addition's transatlantic freight volume will grow 54% over last year by 1955 to 260 million tons, more than triple that to 479 million by 1960. His basis these projections on lower rates made possible by all major DC-4s and Super Constellations. The company has expanded its south DC-4 and stated it for future use in its Atlantic freight service.

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JAP AIRLINE CREWS TRAIN IN U. S.

Grounded since V-1 Day, the Japanese are taking initial steps toward getting back into the air. Here a group of 15 Japanese Air Lines employees receive Link trainer instruction at Taito Academy of Aerodynamics, Oak Brook, Ill., under the guidance of Bert Elliott. A total of 15 pilots and 2 navigators are being trained. They will return to Japan in time to be ready to take up their assignments with the international Japanese airline. JAL recently took delivery on two Boeing 707s. Another 100% is coming. \$1.4 million. Sale was handled by William C. Wild, American, New York, N. Y. C.

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## LETTERS

### 'Stretching' Engineers

Concerning your recent article "A Few for Stretching Engineering Supply," an odd batch of engineers can be found at the drafting tables and planning desks in industry now.

Engineers at the current output of the defense industry supply the necessary manpower to meet the demand for war. In order to make enough work with available manpower it is necessary to qualify at minimum.

A number of men have set up to determine the effects of such increases by adding their own drafting schedules in order to protect the interests of industry. Engineers should probably schedule an engineering load which insures the nation's advantage. The strength of industry, particularly with the help of defense contractors, and all other defense plants can result readily with care and concern when work and reductions already have been established.

Businessmen throughout industry that are involved or weather sheets from an engineering firm or company, often feel that it is important to keep the project. Upon consideration, these men prove to be more aware in areas in which technical colleges and universities and some vocational schools are located.

Mr. GUY, DODGE & COOPER  
Deputy Public Information Officer  
HQ, Air Materiel Command  
Maj. Gen. Headquarters Air Force Base, Okla.

### Induced Drag

David Andrus' article in the H.D. was highly interesting, but had things well covered. The writer will note the colored diagram in his article, which depicts the effect of induced drag on an aircraft. The author, however, did not do so for the aspect ratio effect. What Andrus seems to忘 is that the induced drag coefficient is an inverse function of the aspect ratio.

John W. Casper, Jr.  
Red Lake Falls, Minn.

### Praise

I look forward to the new issue of *Aviation Week* to keep up-to-date regarding the activities in the aircraft industry. Your article follows report of government and private enterprises in the aircraft industry in detail and clearly.

WILLIAM H. CLEMANS  
Executive Vice President  
Lear-Coleman, Inc.  
P.O. Box 5185  
Dallas, Tex.

David Andrus' recent article on the gas turbine-powered helicopter was excellent. I would like to add my hearty endorsement of what we believe is an important step forward in the rotor-wing field.

CHARLES KIRKWOOD  
Asst. to the President  
Krause Aircraft Corp.  
Windsor Locks, Conn.

silicon, low alloy and copper etc.  
We are in the position of issuing our  
specifications.

M. LEROY BROWN, Manager  
Aeronautical Department  
General Electric Company, Inc.  
35 West Park Street  
New York 16, N.Y.

*(Aviation Week reprints the typographical errors—Ed.)*

### 'Correct Story'

On behalf of Maj. Gen. Clarence S. French, former commander for production, Air Materiel Command, I wish to express thanks for the correct story concerning the Air Force progress in connection with the Mustang F86.

The story states correctly a lot of information concerning the F86 and I feel it was most helpful to us to have this again.

Mr. GUY, DODGE & COOPER  
Deputy Public Information Officer  
HQ, Air Materiel Command  
Maj. Gen. Headquarters Air Force Base, Okla.

### STRICTLY PERSONAL

#### More Completely

AVIATION WEEK's Bob Shatto discovered in England that an essential equipment item in the new Avro Vulcan is a coat hanger. Test Pilot Eric "Winkle" Brown says he has a hanger hanging from his coat when he walks past in pre-walk parking the 100,000 lb. delta aircraft all by himself.

#### High Rolling

Leigh Engle, a Steelyard Pressman at Franklin, Tenn., has an unusual hobby from the '40's. The Long Island RR copyrighted and printed on its schedule to the south of New Haven, The railroad and only 470 train was late, compared to 1,188 for the same month last year.

#### People

We'll know a Charles Rochester jazz of New York's Lexington Hotel was married the other day at Edith's Inn at the home of Mr. and Mrs. John E. Deacon, 1000 Davis Ridge, of Rockwood, Tenn. The couple were dining during their honeymoon.

Col. Bill Werthlieb

becomes F2H for Alized Land Forces South

Airman Flights stationed at Lemo, Texas.

Aviation Week's George Chisholm was recently rear-ended by a 1956 Oldsmobile in Miami's Yacht Harbor.

After being hospitalized for a week, Col. Leon Sayl of International Maintenance B-52 started on recovery by riding bicycle in 1956, then went to Florida, getting into competitive cycling in 1956.

#### Two Jets in India

Ronald Baker, pilot for Choice Freight at Elkhorn, Neb., was killed in a plane crash near Peshawar, India, on Aug. 21, 1958. It was announced that their new Captain is Capt. Charles M. Jet, and he's the brother of Robin.

#### Monster Gets Up

While talking on the phone with a shiny American Airlines crewmember, Phil Kline, a 20-year-old college student, decided to add a bit of pep to a few words you might say after Avro introduced its new and monstrous electronic communications equipment. Between the excited words, get stuck to the mouthpiece, and the words come out a dozen times as fast as the words themselves.

John W. Casper, Jr.  
Red Lake Falls, Minn.

#### You Can't Resist

Most women are born helpless, but one married one in Los Angeles, Calif. to Louis after the third day with a chip on her shoulder.

"What do you plan to have for Monday, Tuesday and Wednesday?" she demanded, "when a wife is only worth half her weight?"

#### AGFA Wouldn't Like It

The Agfa-Heraeus Corp. prints a Varga pin-up calendar. During the rainy season we reprint stories in helmets."

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HERE'S DRAMATIC PROOF of the damage an arcing fault can cause in an aircraft. To get this picture, G-E engineers arranged a mockup

of an aircraft electrical system, then touched the generator power cable against a test airframe. Note the white-hot glare at point-of-contact!

## G-E "PROTECTION RESEARCH" REDUCES ARC-FAULT HAZARDS IN AIRCRAFT



G-E AVIATION SPECIALIST and customer discuss protective measures for commercial air transport. G-E protective systems are now installed on DC-6Bs, Stratocruisers, the Navy's new F3H, and Lockheed Constellations.

Each week, G-E engineers at Schenectady, N. Y., are furthering their "protection research" on aircraft generator systems. And a single glance at the above photograph will tell you why.

*One serious arc-fault like that shown above, in just one of your aircraft, could cost more than protective devices for an entire fleet! That's why today G-E protective panels and associated components are being designed to give generator systems maximum protection.*

Your planes can now be safeguarded against excessive overvoltage . . . ground faults . . . undervoltage . . . reverse current. And these protective features, in turn, mean greater flight safety for passengers and crew.

Why not look into G-E protective-engineering facilities for your new aircraft generator systems? In addition to the a-c and d-c panels and components now being produced, complete design and production facilities are available. Contact your nearest G-E Aviation Specialist. Or, write Section 210-48, General Electric Company, Schenectady 5, N. Y.

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